

high-class public secondary schools. We must be prepared to face a great financial sacrifice, for some years at any rate, if we were to put secondary education in this country on anything like the level it had reached in America, Switzerland, and Germany. After other speakers had put forward similar claims for consideration of the subject, Lord Londonderry, in reply, said that he felt the weight of the arguments put forward, but the opinions of his colleagues of the Board of Education and himself on this vitally important matter were expressed in such detail and so definitely in the reply forwarded by Mr. Morant to the chamber on September 26 (see NATURE, October 13, p. 595) that on the present occasion he proposed to devote attention rather to the question of commercial education than to that of technical education. The whole matter was one to which the Board were fully alive, and he was very glad to learn from the representations which they had made that day that there was on the part of the chambers of commerce a keen appreciation of the value of that special advanced instruction in the several sections of mercantile practice which the Board had felt it their duty to encourage in the evening schools serving the more important commercial communities.

SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, February 11.—“On Certain Properties of the Alloys of Silver and Cadmium.” By Dr. T. K. Rose.

Attention was directed to these alloys on account of the advantages of using them as the material for trial plates for testing the fineness of silver coin and plate. An examination of the curves of equilibrium between the liquid and solid states of the alloys proved the existence of several compounds of silver and cadmium, some of which have already been recognised in other ways. Horizontal branches of the curve mark the solidification of the compounds Ag_3Cd_2 , AgCd , and AgCd_3 , and the solidification of Ag_2Cd_3 corresponds to a cusp on the curve of initial freezing points.

There is a strong tendency for mixtures of the compounds to form solid solutions. This is strikingly shown in the case of alloys containing more than 80 per cent. of silver. At temperatures in the short range of a few degrees between the initial and final freezing points of these alloys, two bodies exist side by side, but at a lower temperature they coalesce to form a single solid solution provided that sufficient time is allowed for complete mixing by diffusion. For example, in the standard alloy, which contains 7.5 per cent. of cadmium, solidification begins at about 945° , and is completed at about 913° . If the alloy is maintained at some temperature between these points a network of a silver-poor body is gradually formed surrounding crystals of a silver-rich body. If the alloy is subjected for some hours to a temperature a little below 913° , large crystals with regular boundaries are formed occupying the whole area of the field. These alloys are remarkably ductile.

The alloy corresponding to the formula Ag_2Cd is fine-grained and apparently homogeneous. If heated for some time to a temperature of 750° , somewhat below its point of solidification, the cadmium from the surface is volatilised, leaving a layer of pure silver. On removing this during the operation of polishing a black layer is met with, coloured by oxide of cadmium, and underneath this the original alloy is found to exist. The layers are not everywhere of the same thickness, so that in the course of polishing alternate rings of black and white are produced, resembling the well known Japanese decorative metal-work called Mokumé, which is used in jewellery.

The alloy containing about 50 per cent. of silver consists of crystals of a silver-rich body, often pinkish in colour, set in a white matrix composed of AgCd_3 . The 40 per cent. alloy is a hard, brittle substance, the compound Ag_2Cd_3 . As the percentage of silver decreases, a matrix, consisting mainly of AgCd_3 , makes its appearance surrounding the crystals of Ag_2Cd_3 , and specimens containing less than 25 per cent. of silver consist of crystals of AgCd_3 set in a matrix of cadmium.

Several similarities to the silver-zinc series of alloys have been noted.

November 24.—“The Refractive Indices of the Elements.” By Clive Cuthbertson.

In a letter addressed to NATURE in October, 1902, attention was directed to the fact that the refractivities of the five inert gases of the atmosphere, He, Ne, Ar, Kr, and X, as determined by Ramsay and Travers, were, within narrow limits of accuracy, in the proportion of 1, 2, 8, 12 and 20; or, more simply, of $\frac{1}{4}, \frac{1}{2}, 2, 3$, and 5.

In a second letter it was shown that the refractivities of the halogens, Cl, Br, and I, stand also in the relation of 2, 3, and 5 to the same degree of accuracy; but it was pointed out that the figures for P, As, and S, as measured by M. Le Roux in 1861, did not show any similar relation; and it was observed that a re-determination of them would be interesting.

With a Jamin's refractometer, adapted for use with high temperatures, results have now been obtained for Hg, P, and S, which differ widely from those of M. Le Roux. The index of mercury, calculated for a molecule containing two atoms, is placed at 1.001857, a number which agrees closely with the value given by the refractive equivalent of Gladstone. The index of P_2 is found to be 1.001197, and that of S_2 is 1.001101.

In all three cases it is estimated that the margin of error does not exceed $1\frac{1}{2}$ per cent. Comparing these values for P_2 and S_2 with those of N_2 and O_2 , it is shown that the simple relations found in the case of the inert gases and the halogens also hold in the case of nitrogen and phosphorus, oxygen and sulphur; and that an atom of phosphorus retards light four times as much as an atom of nitrogen, an atom of sulphur four times as much as an atom of oxygen.

Efforts have also been made to measure the index of fluorine in the gaseous state, but, owing to the experimental difficulties, success has not yet been attained.

It appears then, that, out of fourteen elements the index of refraction of which has been measured in the gaseous state, twelve conform to the rule that in each chemical group the refractivities of the elements are in the ratios of small integers. The other two, Hg and H, have no allied elements with which they can be compared.

It is pointed out that N, O, and Ne are each followed, in their respective families, by an element the refractivity of which is four times as great, and that, consequently, there are reasons for believing that the elements composing the series N, O, F, and Ne, and P, S, Cl, and A are, in some sense, homologous. Comparing the refractivities of the latter series we see that the power to retard light appears to be closely connected with the valency, increasing as it increases, in spite of the decrease in atomic weight, as shown in the following table:—

	Element			
	P	S	Cl	A
Atomic weight ...	31	32	35.5	40
Refractivity ...	299×4	275×4	192×4	141×4

The series Ne, O, N, show the same relation, and it is probable that the refractivity of C is even higher than that of N.

The refractivity of B, estimated from BCl_3 and BBr_3 , is certainly very great; but whether it exceeds that of C there is not sufficient evidence to determine.

December 1.—“On the Structure and Affinities of Fossil Plants from the Palæozoic Rocks.—V. On a New Type of Sphenophyllaceous Cone (*Sphenophyllum fertile*) from the Lower Coal-measures.” By Dr. D. H. Scott, F.R.S.

The class Sphenophyllales, of which the fossil described is a new representative, shows on the one hand clear affinities with the Equisetales, while on the other it approaches the Lycopods; some botanists have endeavoured to trace a relation to the ferns. The nearest allies among recent plants are probably the Psilotaceæ, which some writers have even proposed to include in the Sphenophyllales.

The new strobilus appears to find its natural place in the type-genus Sphenophyllum, as at present constituted, but it possesses peculiar features of considerable importance, which may probably ultimately justify generic separation. The specimen, of which a number of transverse and longitudinal sections have been prepared by Mr. Lomax, is from one of the calcareous nodules of the Lower Coal-measures

of Lancashire, and was found at Shore Littleborough, a locality rich in petrified remains, now being opened up by the enterprise of the owner, Mr. W. H. Sutcliffe.

The close affinity of the strobilus with *Sphenophyllum* is shown by the anatomy of the axis, which has the solid triarch wood characteristic of that genus, and by the fact that the whorled sporophylls are divided into dorsal and ventral lobes, as in all other known fructifications of this class. But whereas, in all the forms hitherto described, the lower or dorsal lobes are sterile, forming a system of protective bracts, while the ventral lobes alone bear the sporangia; in the new cone, dorsal and ventral lobes are alike fertile, and no sterile bracts are differentiated. On this ground the name *Sphenophyllum fertile* is proposed for the new species.

Each lobe of the sporophyll divided palmately into several segments; the sporangiophores, each of which consisted of a slender pedicel, terminating in a large peltate lamina, on which two pendulous sporangia were borne. In the bi-sporangiate character of the sporangiophores, and in other details of structure, *Sphenophyllum fertile* approaches the *Bowmanites Römeri* of Count Solms-Laubach, while in the form and segmentation of the sporophylls there is a considerable resemblance to the Lower Carboniferous genus *Cheirostrobos*.

The wall of the sporangium has a rather complex structure, the most interesting feature in which is the well-defined small-celled stomium, marking the line of longitudinal dehiscence.

The spores, so far as observed, are all of one kind; they are ellipsoidal in form, with longitudinal crests or ridges; their dimensions are 90-96 μ in length by 65-70 μ in width.

The most characteristic point in the structure of the new cone—the fertility of both dorsal and ventral lobes of the sporophyll—is regarded as more probably due to special modification than to the retention of a primitive condition.

"On the Presence of Tyrosinases in the Skins of some Pigmented Vertebrates.—Preliminary Note." By Florence M. Durham.

An extract can be made from the skins of certain pigmented animals (rabbits, rats, guinea-pigs and chickens) which will act upon tyrosin and produce a pigmented substance. This action suggests the presence of a tyrosinase in the skins of these animals.

The action of the tyrosinase is destroyed by boiling, does not take place in the cold, is delayed by time, requires a temperature of about 37° C., and also the presence of an activating substance such as ferrous sulphate to start it.

The coloured substances produced are in accordance with the colour of the animals used. Black substances are obtained, when animals with black pigment in their skins are used, and yellow substance, when the skin contains the orange pigment. The coloured substances are soluble in alkalis, but insoluble in acids.

Anthropological Institute, November 22.—Mr. H. Balfour, president, in the chair.—Dr. Ed. **Westermarck** read a paper on the magic origin of Moorish designs. The designs are largely derived from charms against the evil eye. A Moor protects himself against the evil eye of another person by stretching out the five fingers of his right hand, saying, "five in your eye." The object of this gesture is to throw back the evil power, *l-bas*, which has emanated from the other person's eye. The number five by itself has thus come to be regarded as a charm against the evil look. This was illustrated by a number of lantern slides, showing charms, and designs grown out of charms. Silver amulets containing a double five grouped in the form of a cross, with a piece of blue glass as a common centre, are in frequent use. Magic efficacy is attributed to the cross, not only because it represents a five, but also, as it seems, because it is regarded as a conductor for baneful energy, which is dispersed by it in all the quarters of the wind. The double five is often represented as an eight-petaled rosette, or a double cross, with or without a well marked centre. By joining the extremities of the lines which form each of the two crosses, two intersecting squares are produced; they are probably intended to represent a pair of eyes. By painting over all the lines which fall within the two intersecting squares, or by hollowing the two squares, the artist produces an empty octagon. The two crosses may also be of

different lengths, and then the joining of the extremities of each cross gives rise to two squares, of which the one is inscribed in the other. The tendency to produce the number five double as double five, an eight petalled rosette, a double cross, or a double square seems to be due to the fact that the protective gesture is sometimes performed both with the right and left hand. By doubling each petal in the eight-petaled rosette, the sixteen-petaled rosette has been produced. The image of an eye or a pair of eyes is also used to throw back the baneful energy emanating from an evil eye. The eye is sometimes represented as round, sometimes as a triangle (the two intersecting triangles seem to represent a pair of eyes), sometimes with a triangular eyebrow. A row of triangular eyes and eyebrows, or of eyebrows alone, is a common design on carpets.

Geological Society, November 23.—Dr. J. E. Marr, F.R.S., president, in the chair.—On an ossiferous cavern of Pleistocene age at Hoe-Grange Quarry, Longcliffe, near Brassington (Derbyshire): H. H. **Arnold-Bemrose** and E. T. **Newton**, F.R.S. The quarry is situated near the top of the plateau, at about 1100 feet above Ordnance-datum. The cave is evidently a master-joint in the limestone, enlarged by water, and, besides being a swallow-hole, has served as a hyæna-den. The large number of mammalian remains found includes lion, hyæna, rhinoceros, *Elephas*, and other Pleistocene forms; but, besides these, there were numerous bones and teeth of fallow-deer, mixed with the Pleistocene remains at all horizons in the cave. The physical conditions are such as to preclude, as the authors think, any idea of a re-deposition of the bones at any date subsequent to the Pleistocene period; and it is concluded, therefore, that the fallow-deer (*Cervus dama*) was a Pleistocene species, although hitherto supposed to be a much later introduction.—The superficial deposits and pre-Glacial valleys of the Northumberland and Durham Coalfield: D. **Woolacott**. Six volumes, published by the North-of-England Institute of Mining and Mechanical Engineers, contain a large number of borings made in the northern coalfield. A considerable proportion of these are most valuable in showing the nature and distribution of the superficial deposits. From them and from field-mapping it is possible to form a fairly accurate conception of the pre-Glacial floor of the district and its drainage, and also of the relative changes of level before, during, and after the Glacial period.

Zoological Society, November 29.—Mr. G. A. Boulenger, F.R.S., vice-president, in the chair.—Observations on the field natural history of the lion made during seventeen years of travel and residence in Central Africa: Captain Richard **Crawshay**.—Some nudibranchs from East Africa and Zanzibar, part vi.: Sir Charles **Elliot**. The paper contained an account of thirty species and varieties, of which eight of the former and one of the latter were described as new.—Some photographs of giraffes and a zebra taken from pictures in the art collection at Windsor Castle, and an old print of a zebra dated 1762: R. **Lydekker**. Mr. Lydekker was of opinion that the picture and print of the zebra had been taken from the same animal.—Two specimens of lorises, one a slow loris (*Nycticebus*) and the other a slender loris (*Loris*), recently acquired by the British Museum: R. **Lydekker**. The latter specimen was pointed out to be sufficiently different from the typical *L. gracilis* to be entitled to subspecific rank.—The morphology and classification of the Assellota group of crustaceans, with descriptions of the genus *Stenotrium* and its species: Dr. H. J. **Hansen**.—The lizard *Lacerta depressa* of Camerano and its varieties: G. A. **Boulenger**, F.R.S.—A small collection of fresh-water Entomostraca from South Africa: R. **Gurney**. The collection comprised examples of five species, three of which were described as new.—The cranial osteology of the Egyptian mastigure (*Uromastyx spinipes*): F. E. **Beddard**, F.R.S.

Chemical Society, December 1.—Prof. W. A. Tilden, F.R.S., in the chair.—The nitrites of the alkali and alkaline earth metals and their decomposition by heat: P. C. **Ray**. These nitrites are shown to be comparatively stable, and their aqueous solutions can be evaporated to dryness without decomposition or oxidation taking place. When barium nitrite is heated it is first converted into barium oxide and

barium nitrate, the latter finally also being decomposed into barya.—Metallic derivatives of nitrogen iodide and their bearing on its constitution: O. **Silberrad**. Guyard's supposed copper derivative of nitrogen iodide is shown to be a cuprosamine periodide. The silver derivative described by Szuhay is found to be a true nitrogen iodide derivative of the formula $\text{NI}_3\text{NH}_2\text{Ag}$.—Synthesis of 1:1-dimethylhexahydrobenzene: A. W. **Crossley** and Nora **Renouf**.—The formation and reactions of imino-compounds, (i.) condensation of ethyl cyanoacetate with its sodium derivative: H. **Baron**, F. G. P. **Renfry**, and J. F. **Thorpe**. This is a preliminary communication regarding the properties of compounds containing the group $-\text{C}=\text{NH}-$, which in some respects closely resembles the $-\text{CO}$ group in reaction.—The affinity constants of aniline and its derivatives: R. C. **Farmer** and F. J. **Wirth**. These constants are best measured in such cases by determining the distribution of the salts between two immiscible solvents applied simultaneously. The following substituents exert a decreasing electronegative action, in the order in which they are given, on the affinity constant of aniline: $-\text{NO}_2, \text{COOH}, -\text{N}=\text{NPh}, \text{Br}, \text{Cl}, \text{Me}, \text{OMe}$.—The attractive force of crystals for like molecules in saturated solutions: E. **Sonstadt**. Crystals of a salt were placed in saturated solutions of the same salt, and the amount of the latter withdrawn from the solution by the attractive force of the crystals was determined periodically.—The Grignard reaction applied to the esters of hydroxy-acids: P. F. **Frankland** and D. F. **Twiss**. A substance which is probably $\alpha\delta\delta\delta$ -tetraphenylerythritol was obtained by the action of magnesium phenyl bromide on dimethyltartrate.—Note on the addition of hydrogen cyanide to unsaturated compounds: A. **Lapworth**. It is shown that in spite of Knoevenagel's assertion to the contrary, there is no experimental evidence that mesityl oxide unites directly with hydrogen cyanide except in the presence of alkalis. The author is now engaged in the examination of a number of products obtained by the interaction of aldehydes with chloroacetates in presence of potassium cyanide.

Mathematical Society, December 8.—Prof. Forsyth, president, in the chair.—The following papers were communicated:—On a deficient multinomial expansion: Major **MacMahon**. A generalisation of the binomial theorem, made by Abel and restated by Cayley, leads to the consideration of the series that is obtained from an ordinary multinomial expansion by restricting the indices of the terms to obey certain Diophantine inequalities. The paper contains investigations of the number of terms in such a series, the sum of the coefficients, and a syzygetic theory of the distinct terms.—The application of basic numbers to Bessel's and Legendre's functions: Rev. F. H. **Jackson**. The author generalises various functions that are expressed by power series by replacing n in the coefficient of x^n by $(p^n - 1)/(p - 1)$. Two generalisations are obtained of Bessel's functions, one being derived from the other by inversion of the "base" p . In the present paper the author shows that these two functions are connected by a relation containing basic exponential functions. He obtains also generalisations of a number of results which bear on the relations between Legendre's functions and Bessel's functions, and he connects the theory of the generalised Legendre's functions with that of the Theta functions.—On groups of order $p^a q^b$: Prof. W. **Burnside**. In a previous paper the author had proved that these groups are soluble. In the present paper it is shown that, subject to certain specified exceptions when the order is even, a group of the specified order in which $p^a > q^b$ must have a characteristic subgroup of order p^a , where a is such that p^a is greater than $p^a q^{-b}$.—On the failure of convergence of Fourier's series: Dr. E. W. **Hobson**. Fourier's series formed for a continuous function may not converge at a point, and then it does not represent the function at the point. In the paper attention is directed to a class of series which fail to converge, but can be made to converge to any assigned value by enclosing suitable sets of terms in brackets and treating the terms in a bracket as a single term. No example has ever been found of a non-convergent Fourier's series which cannot be included in this class. The nature of the set of points in the periodic interval at which a Fourier's series fails to converge is discussed, and it is

shown that, when the function to be represented by the series is continuous, this set has the "measure" zero.—An extension of Borel's exponential method of summation of divergent series applied to linear differential equations: E. **Cunningham**. The object of the paper is to make more precise the connection between Laplace's solution of linear differential equations in terms of definite integrals and the asymptotic expansion of the solution as the product of an exponential function and a descending power series. The latter series, with the exponential factor omitted, is shown to be "summable" in a sense analogous to that of Borel's theory; and it is proved that the fundamental properties of summable divergent series, such as differentiation term by term, addition and multiplication term by term, are valid for the series in question.—On the linear differential equation of the second order: Prof. A. C. **Dixon**.

CAMBRIDGE.

Philosophical Society, November 14.—Prof. Marshall Ward, president, in the chair.—The charge of the α rays from polonium: Prof. **Thomson**, F.R.S. A bismuth disc covered with polonium (or radio-tellurium), as supplied by Sthamer, was mounted on pivots in a vacuum tube. In front of the disc and about 3 cm. from it was a very carefully insulated gold-leaf electroscope which could be charged with either positive or negative electricity. The vacuum tube was exhausted by first pumping out as much air as possible by a mercury pump, and then using Dewar's method of extracting the remainder of the air by dense charcoal cooled by liquid air. In this way vacua were obtained very much superior to those got by pumping alone. It was found that at these very low vacua the electroscope in front of the polonium if negatively charged leaks so slowly that it is hardly possible to measure the leak with accuracy; while if the electroscope is positively charged its leak is very rapid, certainly more than 100 times the leak when charged negatively. Thus the polonium gives out large quantities of negative electricity, but not enough positive to be detected; this is very remarkable, as polonium is generally supposed to give out nothing but α rays. In order to see that the positive electricity had not been swamped by the negative the instrument was placed in a strong magnetic field; this stopped the negative corpuscles coming out of the polonium from reaching the electroscope, and it was found that now the latter no longer leaked when charged with positive electricity; but though the negative particles had been stopped no positive ones could be detected, for there was no leak from the electroscope when negatively electrified. The author was never able to be sure of any increase in the charge of a negatively electrified body placed near the polonium; this he thinks is due to the negative particles from the polonium moving so slowly that they are unable to make headway against the repulsion exerted by a negatively electrified body. The α rays of polonium are deflected by a magnet, hence they must be positively charged at some part, at any rate, of their course, yet no trace can be found of this charge when the rays strike against an electroscope. The question is discussed whether the α particles lose their charge when they pass through the cloud of negative ones near the polonium, or whether they are alternately charged and discharged, the time during which they are uncharged being much longer than the time they are charged.—On the dynamical significance of Kundt's law of selective dispersion in connection with the transmission of the energy of trains of dispersive waves: Prof. **Larmor**, F.R.S.—The chlorination of α picoline: W. J. **Sell**, F.R.S.—An attempted synthesis of uric acid: H. J. H. **Fenton**, F.R.S.—The diffusion of hydrogen through palladium: O. W. **Richardson**. The paper is chiefly a criticism of the conclusions drawn by Mr. G. N. St. Schmidt (*Drude's Ann.*, vol. xiii. p. 747) from his experiments on this subject. The author shows that the known facts can be explained on the hypothesis that the hydrogen inside the metal is dissociated, in the same way as for platinum.—Optically active nitrogen compounds: Miss M. B. **Thomas** and H. O. **Jones**. The work was undertaken in order to find out what connection exists between the constitution of optically active nitrogen compounds and the numerical value of their rotatory power. The rotation for a basic ion may be determined by preparing the salt with an acid of known rotatory power, and subtracting the rotation due

to the acidic ion from the total rotation of the salt in aqueous solution. The series of substituted ammonium salts under investigation contain the phenyl, benzyl, and methyl radicals with ethyl, isopropyl, *isobutyl* or *isoamyl*. The paper contains a brief account of the resolution of the isopropyl compound by means of its dextro-brom-camphor-sulphonate.

DUBLIN.

Royal Dublin Society, November 15.—Dr. R. F. Scharff in the chair.—Prof. T. Johnson gave an account of a disease of swedes which has caused considerable loss in different parts of Ireland, especially in the west. The small leaves become "spotted," turn yellow, and fall off. The attack is due to *Cercospora Bloxami*, Berk. and Br., which causes disease in swedes in Germany and Switzerland. Associated with the Cercospora from different localities, the author found a *Phoma*-stage, suggestive of *Phoma Brassicae*, Thüm., and in one locality, associated also with Cercospora, *Pleospora herbarum*, β *Brassicace* (Lasch), Sacc. The swede disease shows a curious parallelism with the disease of the sweet chestnut investigated by Berlese in Italy, where Cercosporula, *Phoma* or *Phyllosticta*, and *Sphaerella* stages are associated.—Prof. W. F. Barrett, F.R.S., read a paper on a method of protecting the hands of the operator from X-ray burns. The author stated that in taking some radiographs of surgical cases during the first three months of 1896 (shortly after Röntgen's discovery) he noticed the extreme opacity to the X-rays of any bandages which contained a dressing of iodoform. This led to a series of experiments on the relative transparency of bodies to the X-rays, and it was discovered, early in March, 1896, that all bodies of high molecular weight, such as iodoform, were opaque to these rays. If, then, the burns produced by the X-rays be due to those rays which cannot penetrate a layer of iodoform, it is easy to construct gauntlets with an inner lining filled with iodoform which would entirely protect the hands of the operator. Such gloves would be far more flexible and far lighter than gloves with a lead lining. The author added to his paper an historical note on the relative transparency of bodies to the X-rays, giving a brief summary of the work done.

MANCHESTER.

Literary and Philosophical Society, November 15.—Prof. W. Boyd Dawkins, F.R.S., president, in the chair.—Dr. W. E. Hoyle exhibited specimens of certain rare Cephalopoda:—(1) *Ancistrochirus lichtensteini* from the Maldivian Archipelago, the type specimen in the Paris Museums being the only one previously known. (2) A species of Cirroteuthis from the neighbourhood of the Cape of Good Hope, beautifully preserved in formalol, and exhibiting the gelatinous appearance and rounded stumpy form of the animal in a way never seen in examples preserved in alcohol. (3) Section of an octopod embryo from Zanzibar showing a number of peculiar chitinous rods in the epithelium.—Mr. F. Nicholson communicated a note on the mistaken idea that birds are seed-carriers, in which the author stated that he had found no evidence from his own observations, extending over many years, that entire seed can pass through a healthy bird. In confirmation of this view Mr. Nicholson quoted two passages from Macgillivray's "A History of British Birds," in which the author states that of many hundreds of berry-eating and seed-eating birds which he had opened there were only two which showed the presence of whole seed in their intestines, and these two were in all probability cases of diseased action.—Mr. R. W. Ellison exhibited a number of birds' eggs, including specimens of the following:—the great black-backed, the lesser black-backed, the herring, and black-headed gulls, the Sandwich and lesser terns, the ring sandpiper, and the guillemot. The selection was made with the view of demonstrating certain facts as to the coloration of the eggs and its relation to that of their surroundings.

PARIS.

Academy of Sciences, December 5.—M. Mascart in the chair.—On the general formula giving the number of double integrals of the second species in the theory of algebraic surfaces: Emile Picard.—On the nepheline rocks of Tahiti: M. Lacroix. A detailed examination of a series of rocks from Tahiti constitutes a continuous series from a petrographical point of view, in which the mineralogical

variations are essentially the result of an increase in the amount of lime, iron, and manganese, accompanied with a corresponding reduction in the amount of silica and alkalis.—On differential equations of a parabolic type: Vito Volterra.—Observations on the Perseids for 1904, and the determination of their heights above the ground: V. Fournier, A. Chaudot, and G. Fournier. The observations were carried out on the nights between August 9 and 16. 274 meteors were registered, 180 of which were Perseids. Only 27 of these were of the first magnitude, the greater part being of the third or fourth order. With the view of determining the heights of some of the meteors simultaneous observations were carried out on the night of August 16 at Rouvray and at Morvan (Côte d'Or), two stations 101 kilometres apart. 32 shooting stars were noted at the first station, and 52 at the second, 13 of these being common to both, and of these 4 have been reduced. The height at the first appearance varied from 107 to 283 kilometres, at disappearance from 35 to 66 kilometres, and the length of the trajectory from 56 to 245 kilometres. The average height for the first appearance was 168 kilometres, and of disappearance 53 kilometres, these figures being greater than those obtained by M. Chretien in 1901.—On groups of the order p^m (p prime, $m > 4$) of which all the divisors of the order p^{m-2} are Abelian: M. Potron.—The design of high-speed vessels: Vice-Admiral Fournier.—On stereoscopy: Paul Helbronner. The object of the experiments was, whilst preserving the strong magnification of the telescope objective, to get the details standing out in clear relief. The arrangement described has been used in geodesic work in the French Alps, and has been found very useful.—Researches on dielectric solids: V. Crémieu and L. Malclès. By means of a quantitative study of the phenomena described qualitatively in a previous note, the diminution of electrical influence through solid dielectrics by the production in the dielectric of a reactive charge is clearly established.—Experiments permitting of the demonstration of the *n*-rays: H. Bordier. With the view of removing objections to the purely subjective experiments which are used for the detection of the *n*-rays, the author has applied with success a photographic method, very long exposures being employed on account of the feeble intensity of the light emitted.—On the composition of colloidal granules: Victor Henri and André Mayer. The composition of the colloidal granules of copper ferrocyanide studied by J. Duclaux may be considered as a particular case of the phenomenon of adsorption. The granules may be looked upon as formed by copper ferrocyanide which has adsorbed a certain quantity of potassium ferrocyanide. It is not necessary that compounds of indefinite chemical composition should be assumed.—The action of methylene chloride upon toluene in the presence of aluminium chloride: James Lavaux. It is shown that the ditolylmethane and dimethyl-anthracene isolated by previous workers on this reaction are mixtures. From the former the author has isolated dimeta- and dipara-ditolylmethane, and β -methylanthracene, and from the latter three isomeric dimethylanthracenes.—On the retrogradation of some cyclic secondary amines: P. Lemout. Amines of the type $R-NHR'$ on heating with PCl_5 give some of the primary amine RNH_2 , together with $R'Cl$. The reaction was best marked with the methyl-anilines.—On the organic combinations of metals in plants: MM. Schlagdenhauffen and Reeb.—On the synthesis and chemical nature of sorbierite: Gabriel Bertrand. It is shown synthetically that the sorbierite described by the author in a previous paper is identical with the *d*-idite of Fischer and Fay.—The biological rôle of the diffusion of liquids: Stéphane Leduc.—Researches on the germination of the spores of some yeasts: A. Guilliermond.—On the anatomical modifications which are produced in the course of the evolution of certain rhizomes: André Dauphiné.—Biospeleology: Armand Vire. A discussion of the bearing of the evidence of the animals found in caves on the theory of evolution.—Osmotic communication between the vital and exterior media in certain marine Selacian fishes: René Quinton.—*Lernaeenicus Sprattae*, a parasite of the sardine on the coasts of Vendée: Marcel Baudouin.—The action of calcium permanganate on alkaloids, and in particular on strychnine: G. Baudran.—The nutritive value of cows' milk, sterilised at $108^\circ C.$, for artificial feeding: G. Variot. As the result of work carried on over a period of

twelve years, on an average of 150 to 200 infants daily, the conclusions are drawn that milk sterilised at 108° C. preserves all its nutritive value, and is in no way inferior to milk pasteurised at 80° C. or simply heated to 100° C. No appreciable decrease in the readiness with which the milk was assimilated could be noticed, and not a single case of infantile scurvy occurred. The percentage of infants incapable of utilising sterilised milk was between 3 per cent. and 4 per cent.

NEW SOUTH WALES.

Royal Society, October 5.—Mr. C. O. Burge, president, in the chair.—Ethnological notes on the aboriginal tribes of New South Wales and Victoria: R. H. Mathews.—Preliminary observations on radio-activity and the occurrence of radium in Australian minerals: D. Mawson and T. H. Laby. A brief summary of observations on the radio-activity of minerals and occurrence of radium is given, showing that comparatively intense activity is only found associated in minerals with thorium and uranium. A torbernite and euxenite were found highly active, but the specimens were too small to examine for radium. A Western Australian gadolinite, found by Prof. Norman Collie to contain one bubble of helium in ten grams, was expected to contain radium, but none could be detected. Twelve monazites were found radio-active; one, with double the average activity of the others, from Pilbara, Western Australia, gave on heating the radium emanation; five monazite and zircon sands were also active. No relation between thorium contents and activity was found, which points to the presence of uranium.—The flood deposits of the Hunter and Hawkesbury Rivers: Prof. F. B. Guthrie and Prof. T. W. Edgeworth David.

CAPE TOWN.

South African Philosophical Society, September 28.—Dr. J. D. F. Gilchrist, president, in the chair.—A new South African cypress, *Callitris schwarzi*, Marl.: Dr. R. Marloth. The two species of cypress hitherto known from South Africa belong to the genus *Widdringtonia*, which, however, is now mostly merged into the genus *Callitris*. Until recently only one other species of *Widdringtonia* was known, viz. *W. Commersoni* from Madagascar, but lately a fourth species has been found by Whyte on the Shire Highlands, called by Sir H. H. Johnston the Malanje cedar. The South African species are *C. juniperoides*, the so-called Cape cedar, and *C. cupressoides*, the sapreehout. The former is a tree from 30 to 40 feet high, and occurs only on the Cedar Mountains, while the latter is only 10 to 12 feet or rarely 15 feet high, but is common on all the mountains of the south-western districts. When recently the author heard that some "Sapree" trees in the Baviaanskloof Mountains were 50 to 60 feet high, he suspected at once that this must be a different species, and an examination of some ripe cones proved that this tree is quite distinct from the common *C. cupressoides*.—The Glacial conglomerate in the Table Mountain series near Clanwilliam: A. W. Rogers. This communication is an extension of one read before the society in 1901. The conglomerate with glaciated pebbles has now been traced through a distance of about 23 miles near Clanwilliam.—South African Verbenaceæ, supplementary note: H. H. W. Pearson.—Further note on factorisable continuants: Thos. Muir.—South African Hymenoptera: P. Cameron.—On the structure of the endothiodont reptiles: R. Broom.

October 26.—Sir David Gill, K.C.B., F.R.S., vice-president, in the chair.—The rocks of Tristan d'Acunha, brought back by H.M.S. *Odin*, Commander Pearce, R.N., and their bearing on the question of the permanence of ocean basins: E. H. L. Schwarz. Through the courtesy of Commander Pearce, of H.M.S. *Odin*, a number of specimens were recently obtained for the South African Museum from the island group of Tristan d'Acunha. The islands are described in the *Challenger* reports, and from the accounts published in them it is evident that while Inaccessible Island and Tristan d'Acunha itself are ordinary volcanic islands, Nightingale Island is a gigantic agglomerate neck like those that the author has described from Griqualand East, on the flanks of the Drakensberg Mountains. Two rocks of a type unusual to volcanic islands were brought back by the expedition; one was a white mica and biotite gneiss from Tristan d'Acunha, the other a lava containing foreign fragments from Nightingale Island.

DIARY OF SOCIETIES.

THURSDAY, DECEMBER 15.

ROYAL SOCIETY, at 4.30.—On the Ultra-violet Spectrum of Gadolinium: Sir William Crookes, F.R.S.—An Analysis of the Results from the Falmouth Magnetographs on "Quiet" Days during the Twelve Years 1891 to 1902: Dr. C. Chree, F.R.S.—The Halogen Hydrides as Conducting Solvents. Part iii. Preliminary Note: B. D. Steele.—The Halogen Hydrides as Conducting Solvents. Part iv. Preliminary Note: B. D. Steele, D. McIntosh, and E. H. Archibald.—Effects of Temperature and Pressure on the Thermal Conductivities of Solids. Part i. The Effect of Temperature on the Thermal Conductivities of some Electrical Insulators: Dr. C. H. Lees.—The Basic Gamma Function and the Elliptic Functions: Rev. F. H. Jackson, R.N.—On the Normal Series satisfying Linear Differential Equations: E. Cunningham.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Discussion on Mr. Searle's Paper, Studies in Magnetic Testing; Followed by The Combination of Dust Destruitors and Electricity Works, Economically Considered: W. P. Adams.

LINEAR SOCIETY, at 8.—The Ecology of Woodland Plants: Dr. T. W. Woodhead.—Experimental Studies on Heredity in Rabbits: C. C. Hurst.

FRIDAY, DECEMBER 16.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Heat Treatment Experiments with Chrome-Vanadium Steel: Capt. H. Riall Sankey and J. Kent-Smith.—Messrs. Seaton and Jude's Paper on Impact Tests on the Wrought Steels of Commerce will be discussed.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Folkestone Harbour: Cylinder-Sinking at the Root of the Old Pier: R. H. Lee Pennell.

MONDAY, DECEMBER 19.

SOCIETY OF ARTS, at 8.—Musical Wind Instruments, Flutes: D. J. Blaikley. INSTITUTE OF ACTUARIES, at 5.—On the Retrospective Method of Valuation: Frederick Bell.

FARADAY SOCIETY, at 8.—The Electric Furnace; its Origin, Transformation, and Applications. Part ii.: A. Minet.—Electrolytic Analysis of Cobalt and Nickel: F. Mollowo Perkin and W. C. Preble.—(1) The Electrolytic Preparation of Tin Paste. (2) Note on the Electrolytic Recovery of Tin: F. Gelsthorpe.

TUESDAY, DECEMBER 20.

ROYAL STATISTICAL SOCIETY, at 5.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Discussion on the Construction of a Concrete Railway-Viaduct: A. Wood-Hill and E. D. Pain.

WEDNESDAY, DECEMBER 21.

GEOLICAL SOCIETY, at 8.—Certain Genera and Species of Lytoceratidae: S. S. Buckman.—(1) The Leicester Earthquakes of August 4, 1893, and June 21, 1904. (2) The Derby Earthquakes of July 3, 1904. (3) Twin-Earthquakes: Dr. C. Davison.

ROYAL MICROSCOPICAL SOCIETY, at 8.—The Theory of Highly Magnified Images: J. W. Gordon.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—Discussion of Mr. F. J. Brodie's paper, Decrease of Fog in London during Recent Years. Followed by The Study of the Minor Fluctuations of Atmospheric Pressure: Dr. W. N. Shaw, F.R.S., and W. H. Dines.

CONTENTS.

PAGE

Human Anatomy. By Dr. A. Keith	145
Earthquakes	147
Technical Mechanics. By Prof. George M. Minchin, F.R.S.	148
Our Book Shelf:—	
Hill: "Machine Drawing"	149
Cockin: "An Elementary Class-book of Practical Coal-mining"	150
Cecil: "Bird Notes from the Nile."—R. L.	150
Letters to the Editor:—	
Education and National Efficiency in Japan.—Dr. Henry Dyer	150
The Heating Effect of the γ Rays from Radium.—Prof. E. Rutherford, F.R.S., and Prof. H. T. Barnes	151
Singularities of Curves.—T. B. S.	152
A Christmas Bird-book. (Illustrated.) By R. L.	152
The Present Condition of the Sea-Fishing Industry. (Illustrated.)	153
The Eleventh Eros Circular. By Prof. H. H. Turner, F.R.S.	154
Notes	155
Our Astronomical Column:—	
Relations between Solar and Terrestrial Phenomena	158
Sun-spot Spectra	158
Eclipse Observations	159
The Appearance of Spark Lines in Arc Spectra	159
The Royal Astronomical Society of Canada	159
The First True Maps. By C. Raymond Beazley	159
Geological Notes	161
Scientific Research in the Philippine Islands. By Prof. R. T. Hewlett	162
University and Educational Intelligence	162
Societies and Academies	164
Diary of Societies	168